RESEARCH ACTIVITY SHEET

2025 PhD selections

YOUR DETAILS

* Name & Surname: Barbara Alicja Jereczek-Fossa

* Affiliation IEO

PHD PROJECT DETAILS

* Title of the proposed project

Investigating the role of new oncological drugs in the high-precision radiotherapy era with a focus on proton therapy (the High-Rad Project)

* Short description of the project (up to 300 words)

Background
Several factors play a role in cancer progression and response to radiotherapy.
A heterogeneous tumor microenvironment, the varying patient characteristics, as well as the radiotherapy schedule and timing of administration complicate the dynamic relationship between radiotherapy and this immune landscape. With the development of high-precision radiotherapy, the identification of patients who will be benefits from tailored radiotherapy schedules and techniques (including both particle therapy and photons) in combination with immunotherapy is becoming a crucial unmet topic.

Aim
This project aims to build a predictive model able of choosing the best therapeutic strategy considering the individual patient and tumour features.

Methods
1. Systematic review of in vitro/clinical studies identifying factors and investigating patterns of radioresistance/radiosensitivity
2. Retrospective cohort study addressing patient and tumour features associated with patterns of failure or benefit of radiotherapy; machine learning approaches will be used for building a model including text (clinical records), medical imaging, histopathologic and genomics data for predicting radioresistance/radiosensitivity; empirical data collected in clinical practice of IEO radiotherapy division as well as those identified from systematic review (please see point 1) will be integrated in the model
3. Real data cohort study aimed to apply the identified algorithm in order to validate the model.

* Indicate the main research area for the project described above: Computational biology

If needed indicate a second research area for the project described above:
Computational biology

* Provide up to 3 key words for project:

Radiation Oncology; Proton Therapy; Predictive Model.

YOUR LABORATORY ACTIVITIES DETAILS

* Main topic/s of the lab

Stereotactic body radiotherapy; intensity-modulated radiotherapy; brachytherapy; proton therapy, new drugs.

* Short description of the lab activity (up to 500 words)

IEO (European Institute of Oncology) is a leading cancer center that fosters multidisciplinary collaboration between clinical and research departments.
As a University Hospital, IEO is actively involved in teaching activities for both pre- and post-graduate students, including medical specializations and the PhD program of the European School of Molecular Medicine (SEMM).
The Radiotherapy Department at IEO is the largest radiotherapy facility in Italy and is chaired by Professor Barbara Alicja Jereczek-Fossa from Milan University.
The department not only provides patient care, but also conducts cutting-edge cancer research and offers comprehensive pre- and postgraduate education.
The Division of Radiotherapy has always been interested in enhancing technological development, improving the quality of treatments, developing multidisciplinary diagnostic and therapeutic guidelines, and increasing scientific research and its application in clinical practice. It is equipped with state-of-the-art linear accelerators (LINACS) for radiation therapy treatments, including TomoTherapy (2 units), Varian Trilogy, Varian TrueBeam, and CyberKnife, with the latter three specifically dedicated to stereotactic body radiation therapy (SBRT) and differing in image guidance. The department also has PDR and HDR brachytherapy capabilities. In addition, since the end of 2023, a proton therapy facility is operational, enabling the performance of intensity-modulated proton therapy (IMPT) in selected patients.

* Recent bibliography (max 5 references)

* Group composition: total members, and roles distribution (PhD, postdoc, technician, etc.)

The staff of the Radiotherapy Department at IEO is composed by different professional figures, such as:

- physicians
- medical physicists
- radiation therapy technicians
- nurses
- data managers
- researchers
- PhD student

Institutional page link

https://www.ieo.it

Lab website link, if any

https://www.ieo.it/it/CHI-SIAMO/Come-siamo-organizzati/Le-divisioni/Divisione-di-Radioterapia-RTPDV/

Social media links, if any

https://www.facebook.com/IstitutoEuropeoDiOncologia/?locale=it_IT
https://www.instagram.com/ieoistitutoeuropeodioncologia/?hl=it
https://it.linkedin.com/company/ieo-istituto-europeo-di-oncologia

If you prepare a video to promote your lab/project, please include the link below